


LAND MANAGEMENT ALTERNATIVES FOR THE NHAL

Introduction

This section presents a range of six alternatives for land management on the NHAL. The alternatives describe both the desired future condition of the forest and the management techniques required to achieve that condition. The range of alternatives is based on the state statute on state forests, the property vision and goals, scientific assessments, the DNR’s extensive experience managing the property, and public input. Due to the complexity and size of the NHAL, the alternatives are broad in nature and designed to allow for public feedback without delving into site-specific information.

	Alternative 1	Alternative 3	Alternative 6
Future Desired Conditions	Emphasis on young, early successional forests (ie aspen and birch) managed at trees’ economic age	Emphasis on longer-lived forests (pines and hardwoods) managed at trees’ biological age with a variety of young and old forest communities	Emphasis on older pine and hardwoods and old growth forests
			
Management Intensity Levels	More frequent and larger-scale management with many techniques (selective harvest, clear cuts); Big Tree Silviculture not used	Variety of intensities and techniques from passive mgmt to clear cuts	Limited scale and frequency of management- Passive mgmt on 36% of the NHAL; range of techniques used elsewhere

The land management alternatives section includes background information, maps, and descriptions of the six alternatives. First we present a map of the ecological landscapes of the NHAL along with descriptions of the soils, topography, vegetation, current and presettlement condition, and ecological capability of each landscape (p.8-11). On page 13, we outline the process used to develop the alternatives. Pages 15-20 define the “future desired condition” and “management intensity level” categories. Next is a description of the current condition and land management of the NHAL as a whole (p. 21). These pieces provide the background necessary to understand the alternatives. Finally, we present the six alternatives with descriptions and then maps for each one (p. 25-55).

As you begin to analyze the alternatives, please keep in mind that the maps are a simplification of a large, complex property with a variety of wetland and upland communities.

Please also keep in mind that all the alternatives would comply with the “givens” listed near the beginning of this document. For example, all timber harvests would comply with Wisconsin’s Best Management Practices for water quality (BMPs) although the BMPs are not mentioned in each alternative. In addition, each alternative should meet every property goal, at least minimally. The primary difference between the alternatives is the level of emphasis—which goals have priority over other goals. In your feedback on the alternatives, we ask that you evaluate which aspects of the alternatives best serve to meet the property vision and goals as well as your own values for the NHAL. We are particularly interested in the reasons you prefer aspects of one alternative over another, and encourage you to explain your choices in the feedback section at the end of this document.

## **Ecological Landscapes**

One of the Northern State Forest Assessments, the Regional Ecology Assessment, used the National Hierarchical Framework of Ecological Units (NHFEU) to describe the overall ecological characteristics of the NHAL. Within this national classification system the NHAL State Forest is located primarily in the Northern Highland Pitted Outwash subsection with a small amount of the northwestern edge of the NHAL in the Winegar Moraines subsection. Each subsection has specific regionally significant ecological resources. The Northern Highland Pitted Outwash subsection includes high densities of kettle lakes, the headwaters for many streams, large open acid peatlands and sedge meadows, and extensive dry forest types (i.e. pine). The Winegar Moraines are characterized by upland moraines with loamy soils and hemlock-hardwood forests, and by large wetlands, including cedar swamps and acidic kettle lakes. This regional information is important because it defines how the capabilities of the NHAL differ from other large public lands such as county and national forests in northern Wisconsin. The ecological landscapes described below, however, present the diversity of ecological settings within the NHAL. Except for the Winegar Moraines, all listed ecological landscapes are within the Northern Highland Pitted Outwash.

An important foundation of the state forest planning process was to establish the ecological potential of various regions within the NHAL. In order to provide this foundation, an integrated team of DNR professionals from Forestry, Wildlife and Endangered Resources described the ecology of different areas on the NHAL. Using existing information on soils, topography, vegetation, and pre-settlement and current conditions, and well as new information generated through the Northern State Forest Assessments our scientists developed a map of different ecological units on the NHAL (see the [Ecological Landscapes Map](#)). The ecological capabilities of these units provide the framework for what a specific area is capable of producing and what it does best. The acreages presented in the descriptions below include both public and private land within the forest boundary.

### **Vilas/Oneida Sandy Plains**

The Vilas/Oneida Sandy Plains is by far the most common ecological landscape on the NHAL State Forest. It covers 170,800 acres, or approximately 59% of the land within the NHAL boundary. This landtype has a rolling characteristic to the lay of the land. The soils are excessively well-drained sands, which tend to get very dry and are subject to wildfire. Historically, fire was a significant factor in the Vilas/Oneida Sandy Plains, and irregular fires that burned some of the stands occurred on 50 to 200 year cycles. Before northern Wisconsin was settled, this area was mostly covered with white and red pine stands, with white birch and aspen found secondarily across the area. Today, aspen dominates this areas with white birch, red oak, and red pine being significant. White pine exists in most stands of aspen while small stands of jack pine are also present. The management opportunities for this area are to increase the pine acreage over time; but the use of regeneration cuts to encourage aspen, white birch and jack pine would simulate some of the natural disturbance that fire created in the past. Some fire use may be incorporated into management.

### **Manitowish Peatland**

The Manitowish Peatland includes approximately 27,000 acres, which represents 9% of the land within the NHAL boundary. The topography is nearly level throughout. This area is generally bog, with small sandy islands common. The soils are mostly very poorly drained organic peat. Some areas have sands and loamy sands. Historically, both fire and floods, with the water table rising in wet years, and dropping in drought years was the major influence to the vegetation. Bog, poor fen and tamarack forest are the historical cover types, and is represented much the same today. Management today has the opportunity to protect the habitat and rare species that prefer it.

**Vilas/Oneida Sandy Hills**

The Vilas-Oneida Sandy Hills ecological unit covers approximately 20,800 acres, or 7% of the NHAL, and is the third most common type within the NHAL boundary. The topography is mostly of a rolling character. The soils are excessively drained loamy sands. Some sandy loams and organic deposits are common. Historically, fire was the dominant disturbance factor. Prior to settlement in the area, white pine and red pine were the most common tree species. Secondary in importance, the aspen and white birch were common. Eastern hemlock could be found where soil drainage was poor, and frequently along lake and streams edges. Today, aspen dominates the landscape in this management area, with red oak and white birch as well as red pine being significant. Some red and white pine exists within the aspen stands, and can be encouraged to more fully dominate the site in time. This area has an opportunity to manage for a variety of age classes of pines, oaks, aspen and birch. Foresters can work with successional trends to encourage the percentage of pine over this landscape.

**Winegar Moraines**

The Winegar Moraines ecological unit on the state forest covers roughly 14,600 acres, or 5% of the NHAL. The terrain is mostly rolling, but includes some steep slopes. Lowlands are common in this unit. The most common soils are described as sandy loam, which can hold moisture to a greater degree than most of the other upland soils on the state forest. Windstorms were the most significant disturbance factor historically. Blowdowns affected both individual trees, and small groups of trees. Larger patches of forest were affected by windstorms at infrequent intervals. Historically, eastern hemlock and yellow birch were dominant, with sugar maple as an important secondary species. In the lowlands, tamarack and spruce were most common. Today, older stands of aspen, and northern hardwoods are the dominant timber type on the uplands. The dominance of eastern hemlock or sugar maple would have to be developed with selective thinnings in the northern hardwood type. Yellow birch is present in the stands, and with some gaps created in the forest stands it could potentially become a greater component in the future.

**Big Arbor Vitae Loamy Hills**

The Big Arbor Vitae Loamy Hills ecological unit covers approximately 14,600 acres, or 5% of the NHAL. It is the fifth most common ecological zone within the state forest boundary. There is a rolling character to the topography here. This area has predominantly a well-drained sandy loam soil, however the soils vary in this unit from sand to poorly drained organic types. Wetlands and lakes are common. Historically, fire was a major disturbance factor. Because of the mixture of soils and lakes interspersed with wetlands, the presettlement forest was patchy and diverse. The main tree species present were eastern hemlock, white birch and white pine. Secondly, the aspen, red pine, yellow birch and sugar maple were important. Tamarack was dominant on the lowlands, with some white cedar and black spruce present. Today aspen is the most common cover type, with northern hardwoods, red and white pine significant. The forested lowlands are primarily black spruce. The opportunity to restore the significance of white pine, white birch and the northern hardwood species (red oak, yellow birch, sugar maple and eastern hemlock) exists. Harvests that encourage the shade loving species include thinnings and gap openings. To perpetuate stands of white birch and oak, significantly more open management harvests, including clearcuts will be necessary in those areas.

**Trout Lake Drumlins**

The Trout Lake Drumlin ecological unit (located in the north-central region of the forest) accounts for approximately 11,500 acres, or 4% of the NHAL. The land has predominantly rolling terrain. The soil is well drained sandy loam to slightly heavier loamy sand. Historically, this area was influenced by the frequent disturbance of fire. White and red pine dominated presettlement vegetation. White birch was an important secondary species. In the lowlands, tamarack was most common. Today, the forest type in this area is dominated by the aspen cover type, and secondarily by red oak. With forest management, the longer lived white pine and red oak forest can be encouraged, and abundance of these types increased over time. White pine seedlings can develop under existing trees. Foresters usually encourage the development of white pine with selective tree harvesting. To maintain oak and white birch however, selective harvesting is

less successful. Harvesting in "patches" or "strips" which open up ground areas to full sunlight is more successful to encourage survival of seedlings of these trees.

**Kathan Lake Sandy Plains**

The Kathan Lake Sandy Plains ecological unit covers approximately 11,100 acres, or 4% of the NHAL. Its timber type potential is very similar to that of the Vilas/Oneida Sandy Hills above. However, a lot of lowland/organic soils can be found here as well. A large percentage of the Kathan Lake Sandy Plains is privately owned.

**Rainbow Wetlands (Big Swamp)**

The Rainbow Wetlands/Big Swamp ecological unit covers approximately 11,000 acres east and south of the Rainbow Flowage, or 4% of the NHAL. The topography is mostly level and dominated by peat or organic wet soils. Historically, fire was the dominant disturbance factor. The area consists of a diverse assemblage of northern sedge meadow, shrub swamp, open bog, poor fen and muskeg. Low sandy ridges and islands in the peatland are covered with mixed aspen/pine forest. A mature red and white pine forest covers some of the adjacent uplands. The Rainbow Flowage likely influences this wetland complex. Tamarack is becoming more dominant in the Big Swamp portion of this peatland. Portions of the mature pine forest on the islands and adjacent uplands blew down in the 1999 windstorm. Management opportunities include protection of the wetlands and management of the uplands for a combination of pine, aspen, and white birch.

**Laura Lake Loamy Hills**

The Laura Lake Loamy Hills ecological unit covers approximately 7,800 acres, or 3 % of the NHAL. It is the least common zone within the state forest boundary. The upland forested land has rolling topography. The soils here are mostly well drained sandy loams, and support white pine, white birch and northern hardwoods. The majority of the area has a historical disturbance history of fire, but some areas protected by lake or wetland patterns had more wind storm and blowdown disturbance. Presettlement forests included white pine, white birch and yellow birch. Secondary in importance were the aspen, red pine, and sugar maple. Tamarack and black spruce, with eastern hemlock, white pine as well as some jack pine dominated the lowlands. Today there is more aspen present than in the past, however northern hardwood, oak, and white birch are common. The forest managers have an opportunity to increase the white pine and yellow birch in this area. The hemlock that exists could be maintained, and expanded with every opportunity. The diversity of age classes through selective harvests and gap openings can be expected as management continues toward a present-day forest that resembles the composition of a late-successional forest.

## The Process

Six years ago the WDNR initiated a number of scientific assessments to provide information for the master planning process on the NHAL. The assessments, including Regional Ecology, Biodiversity, Sustainable Forestry, and Community Restoration and Old Growth, along with the NHAL Biotic Inventory, are now complete.

Two years ago we held an issue forum on forest ecosystems, and then presented the public with a range of land management concept statements. We then took the public feedback we received and combined it with our scientific analyses and the experience of property staff to create more fleshed-out land management alternatives<sup>1</sup>. These alternatives range from an emphasis on early successional species and a younger forest in Alternative 1 to an emphasis on older red and white pine and other forests and old growth in Alternatives 5 and 6. Wild Resources Areas, which have specific restrictions on both land management and recreation, are described in a separate set of alternatives (pages 83-96). Land Management Alternative 6 does include the land management implications of Wild Resources Areas.

In developing the land management alternatives, an integrated team of DNR professionals from Forestry, Wildlife and Endangered Resources described the ecology of different areas on the NHAL. Using information on soils, topography, vegetation, and pre-settlement and current conditions, our scientists developed a map of different ecological units on the NHAL (see the previous page). This information, along with information from the Community Restoration and Old Growth, Biodiversity, and Regional Ecology Assessments and from the Biotic Inventory of the NHAL, were used as a basis for these alternatives.

Two studies, the CROG and Biotic Inventory, ranked the ecological potential of a number of sites. In the CROG, “A” sites present the best quality old growth opportunity, and “C” sites moderate quality. In the Biotic Inventory, the sites range from “High-High” to “Low-Low”, with the first rank indicating the site’s significance within the NHAL, and the second rank indicating its regional significance. Table 1 shows how this information was used in the development of the alternatives.

**Table 1. CROG and Biotic Inventory sites incorporated in each land management alternative.**

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
<b>CROG</b>	A sites	A sites	A and AB sites	A, AB, and B sites	A, AB, B, BC, and C sites	A, AB, B, BC, and C sites
<b>Biotic Inventory</b>	High-High sites	High-High sites	High-High and High-Medium sites	High-High, High-Medium and Medium-Medium sites	High-High, High-Medium, Medium-Medium, Medium-Low and Low-Low sites	High-High, High-Medium, Medium-Medium, Medium-Low and Low-Low sites

For more information on CROG and Biotic Inventory sites, please consult the NHAL Sourcebook binder (Chapters 7 and 8) or the CROG and Biotic Inventory reports.

In a series of meetings, property staff along with the master planning core team and expanded team met to outline the short term and long term objectives, management prescriptions, and management limitations for each Biotic Inventory/ CROG site and for each ecological landscape unit not part of a CROG/ Biotic Inventory site. This information was collected for each area on the map in all six alternatives. Due to the large amount of information generated, we summarized that data for this alternatives mailing.

In summarizing the collected data, we created 16 categories that describe the future desired condition. CROG sites listed for each alternative in Table A above appear as Old Growth areas. Biotic Inventory sites

<sup>1</sup> The order of Concepts 3 and 5 are switched so that they are now in a progression from Alternative 1 to Alternative 5.

appear either as Old Growth or as Forested or Unforested Wetlands. For non-CROG/ Biotic Inventory sites, ecological capabilities, public feedback, and the concept statements for each alternative were used to present a range of options for the condition of the forest in the future.

The management intensity level for each area, which describes the intensity of management a visitor might see on the landscape, is described in Levels 0-4.

## **Management Intensity Levels and Future Desired Conditions Defined**

The following Management Intensity Levels and Future Desired Conditions describe the areas shown on the Land Management Alternatives 1-6 Maps.

### **Management Intensity Levels for the NHAL Alternatives**

The descriptions of the management intensity levels below address management techniques, frequency and extent of management practices, and the general objective for such areas. The intensity levels correspond to the dots and hatching on the Land Management Alternatives 1-6 Maps. Due to the broad scale of the alternatives, these designations are a simplification of the site-specific management that would occur on the forest.

**Level 0** = Areas with a Level 0 intensity would be passively managed. No timber harvest or ground disturbance activities would occur in these areas.

**Level 1** = The majority of areas with a Level 1 intensity would be managed primarily for old growth characteristics while maintaining varying age class stands in some areas. The intensity level indicates minimal management and low visual impact. Opportunities to enhance or maintain older community forest types would be a priority. Activities may include thinning, selective harvesting, small group harvesting, hand planting or minimal mechanical planting and small areas of prescribed burning. Management activities would be infrequent and rarely seen.

**Level 2** = The majority of areas in Level 2 would be managed for older bigger trees. This level of management intensity would incorporate more management techniques beyond the level of those described in Level One. This may include: clearcutting, moderate size timber harvest, thinnings, and more additional wildlife management considerations. The ground disturbance could include ground scarification, site preparation, artificial regeneration techniques, prescribed burning and hand/mechanical planting in addition to natural regeneration. Management intensity in Level 2 means that you may occasionally see active management on the landscape. Measures will be taken to minimize the visual impacts of all management activities.

**Level 3** = The majority of areas at this level would be managed for a diversity of age classes and sizes of trees. With this management level there is an increase of management with greater frequency and intensity from Level 2. This means that all forest management techniques may be employed (thinning, clearcutting, passive management, etc.). Management intensity at this level means that you will notice more active forest management on the landscape. Considerations will be taken to minimize visual impacts of all management activities.

**Level 4** = The majority of areas at this level allows for the full range of management activities mentioned in Levels 2 and 3, with greater frequency and at a larger scale. At these sites, there will be more aggressive artificial and natural regeneration techniques such as plantations and scarification. There will be less age class diversity in short lived species and more frequent entry periods in all aged stands. This level would result in frequent forest management activities with considerations taken to minimize visual impacts of all management activities.

**Note:** The above management descriptions are written for forest types and would not apply to non-forested sites.

## **Categories for the Future Desired Condition**

The following categories present the primary and secondary tree species that would be found in broad areas of the NHAL, represented by color in Maps 1-6. They identify areas as either economic age, biological age, or as having old growth characteristics. These three terms are defined in the glossary at the back of this document. The following descriptions explain the forest type, relationship to the ecological landscapes, management objectives, and compatible management intensity levels and practices for each category.

These categories are a simplification of the forest communities on the NHAL. This simplification was necessary in order to present a range of management options at the necessary scale on Maps 1-6.

### Primary: Red and White Pine, Old Growth Characteristics

Secondary: Aspen and Mixed Hardwoods

Where appropriate, the primary desired future condition in these broad areas is a forest with big trees and old growth characteristics dominated by red and white pine. The forest would include a mix of aspen and birch and, in some places, red oak or jack pine. This community type is best suited to the ecological landscapes with sandy soils, so it would be incompatible with the Winegar Moraines and less common in the Arbor Vitae Loamy Hills. Secondary sites would be managed according to the intensity level of the site. Depending on the type of old community, site characteristics, and the overall management concept, management intensity levels 1 and 2 would typically be used to achieve this objective. Management practices such as clearcutting on aspen sites would be used. Wetlands located in these areas would have no ground disturbance activity.

### Primary: Red and White Pine, Biological Age

Secondary: Aspen, and Mixed Hardwoods

The primary desired future condition in these broad areas is a forest dominated by red and white pine. The forest would include a mix of aspen and birch and, in some places, red oak or jack pine. This community type is best suited to the ecological landscapes with sandy soils, so it would be incompatible with the Winegar Moraines and less common in the Arbor Vitae Loamy Hills. The pine in these locations would typically grow to be larger and older than in Economic Age management. Red, white and jack pine plantations would be thinned when merchantable and over crowded. The first few thinnings would be in rows. As they advance in age and diameter, more natural looking selective management would be employed. Any uplands management would be to maintain and enhance the natural pine community type. Oak, aspen, birch and forested wetlands would be managed according to the intensity level of the site, including clearcutting, shelterwood harvest, and strip harvest. Depending on site characteristics and the overall management concept, management intensity levels 2 and 3 would typically be used to achieve this objective. Wetlands located in these areas would have no ground disturbance activity.

### Primary: Red and White Pine, Economic Age

Secondary: Aspen and Mixed Hardwoods

The primary desired future condition in these broad areas is a forest dominated by red and white pine. The forest would include a mix of aspen and birch and, in some places, red oak or jack pine. This community type is best suited to the ecological landscapes with sandy soils, so it would be incompatible with the Winegar Moraines and less common in the Arbor Vitae Loamy Hills. The pine would be harvested at its greatest economic age range, which usually is 90-150 years for white pine and 60-140 years for red pine. Red, white and jack pine plantations would be thinned when merchantable and over crowded. The first few thinnings would be in rows. As they advance in age and diameter, more natural looking selective management would be employed. Stands of oak, aspen, birch and forested wetlands would also be harvested



at economic rotation age range (60-120 years for red oak, 40-60 years for aspen, and 50-90 years for white birch) by techniques such as clearcutting, shelterwood harvest, and strip harvest. Management intensity level 4 would typically be used to achieve this objective. Wetlands located in these areas would have no ground disturbance activity.

**Primary: Jack Pine, Biological Age**

Secondary: Red and White Pine, Aspen, Birch and Red Oak

The primary desired future condition in these broad areas is a forest dominated by natural and plantation jack pine. The forest would include a mix of red and white pine, aspen and birch. This community type is best suited to the ecological landscapes with very sandy soils and frequent disturbance, so it would be most compatible with the Vilas/Oneida Sandy Plains, and upland areas within the Rainbow Wetlands. The jack pine would be harvested at its biological age range, which is 60-80 years. Red and white pine, aspen and birch would also be managed at their ecological rotation ages. Management intensity level 3 would typically be used to achieve this objective, since regenerating jack pine requires ground disturbance for natural regeneration or plantations stands, they would be managed somewhat intensively. Wetlands located in these areas would have no ground disturbance activity.

**Primary: Jack Pine, Economic Age**

Secondary: Red and White Pine, Aspen, Birch and Red Oak

The primary desired future condition in these broad areas is a forest dominated by natural and plantation jack pine. The forest would include a mix of red and white pine, aspen, birch, and red oak. This community type is best suited to the ecological landscapes with very sandy soils and frequent disturbance, so it would be most compatible with the Vilas/Oneida Sandy Plains, and upland areas within the Rainbow Wetlands. The jack pine would be harvested when mature at its economic age range, which is 40-70 years, through clearcutting and scarification or prescribed burning for regeneration. Red and white pine, oak, aspen and birch would also be managed at their economic rotation age ranges through techniques such as thinning, clearcutting, and shelterwood harvesting. Management intensity level 3 or 4 would typically be used to achieve this objective, since jack pine requires ground disturbance for regeneration and would be managed fairly intensively. Wetlands located in these areas would have no ground disturbance activity.

**Primary: Bracken Grasslands**

Secondary: Red Pine, Jack Pine and Pin Oak

The primary desired future condition in this area is an open grasslands and pine system. Bracken grasslands are open shrub and grassy areas with patches of red pine, jack pine and pin oak trees that once resulted from intensive fire disturbance. Maintaining this open site would require more intensive management than any other objective, but the area is lumped into intensity Level 4 for these concepts. Techniques such as prescribed burning and clearcutting may be employed. Wetlands located in this area would have no ground disturbance activity.

**Primary: Hemlock-Hardwoods, Old Growth Characteristics**

Secondary: Hardwoods

The primary desired future condition in these broad areas is a forest with old growth characteristics dominated by hemlock and northern hardwoods. Some stands are more accurately described as hemlock, but too small to map separately. This community type is best suited to the loamy soils of the Winegar Moraines ecological landscape, as well as scattered sites in other ecological landscapes. Depending on site characteristics and the overall management concept, management intensity Levels 0, 1, and 2 would be appropriate to achieve this objective. Hemlock trees would not be harvested. The hardwood management

component would typically be at intensity Level 2, through selective harvesting and other techniques. Wetlands located in these areas would also have no ground disturbance activity.

**Primary: Northern Hardwoods, Old Growth Characteristics**

Secondary: Aspen, Birch and Red and White Pine

The primary desired future condition in these broad areas is a mixed forest with old growth characteristics dominated by northern hardwoods (maple, yellow birch, basswood, etc.). The forest would also include a mix of red oak and pine. This community type is best suited to the loamy soils of the Winegar Moraines ecological landscape, as well as the sandy loams of the Lake Laura Loamy Hills and the Big Arbor Vitae Loamy Hills. Depending on site characteristics and the overall management concept, management intensity levels 0, 1 or 2 would be appropriate to achieve this objective. In the aspen, birch and mixed forest component, management would typically be at intensity Level 2, incorporating clearcutting, thinning, and other techniques. Wetlands located in these areas would have no ground disturbance activity.

**Primary: Northern Hardwoods, Biological Age**

Secondary: Aspen, Birch and Red and White Pine

The primary desired future condition in these broad areas is a forest dominated by all aged northern hardwoods (maple, yellow birch, basswood, etc.). The forest would also include a mix of red oak and pine. This community type is best suited to the loamy soils of the Winegar Moraines ecological landscape, as well as the sandy loams of the Lake Laura Loamy Hills and the Big Arbor Vitae Loamy Hills. Northern hardwoods species would be selectively harvested at a time when tree density is high or stand conditions warrant management activities (ie. Disease, forest health, regulation of stand ages, promotion of large trees, lack of regeneration, addition of new age classes, etc.). Oak and pine would also be managed at the same time as the northern hardwoods to retain a species diversity mixture. Management intensity level 2 would typically be used to achieve this objective. Wetlands located in these areas would have no ground disturbance activity. Forested wetlands would be managed at intensity levels 1 and 2.

**Primary: Northern Hardwoods, Economic Age**

Secondary: Aspen, Birch and Red and White Pine

The primary desired future condition in these broad areas is a forest dominated by all aged northern hardwoods (maple, yellow birch, basswood, etc.). The forest would also include red oak and pine. This community type is best suited to the loamy soils of the Winegar Moraines ecological landscape, as well as the sandy loams of the Lake Laura Loamy Hills and the Big Arbor Vitae Loamy Hills. Northern hardwoods species would be selectively harvested at stand densities similar to Biological Age Management but would target regeneration establishment at lower density residual and extract more timber volume in the process. A variety of tree sizes, including large hardwoods would remain after management activities. A wide array of species would be retained on the sites at all times. Oak and pine would also be managed at the same time as the northern hardwoods. Management intensity level 3 would typically be used to achieve this objective. Wetlands located in these areas would have no ground disturbance activity. Forested wetlands would be managed at intensity levels 1 and 2.

**Primary: Oak, Old Growth Characteristics**

Secondary: Northern Hardwoods, Aspen and White Pine

The primary desired future condition in these broad areas is a mixed forest with old growth characteristics dominated by red oak. The forest would include a mix of northern hardwoods, aspen and pine. This community type is well suited to a variety of sandy to sandy/loamy ecological landscapes. Depending on site characteristics and the overall management concept, management intensity levels 1 and 2 would

typically be used to achieve the primary and secondary objectives. Techniques including thinning, prescribed burning, and clearcutting may be employed. Wetlands located in these areas would have no ground disturbance activity.

Primary: Oak, Biological Age

Secondary: Northern Hardwoods, Aspen and White Pine

The primary desired condition in these broad areas is a mixed forest dominated by red oak and other related species, including white pine, aspen, white birch and red maple. This community type is well suited to a variety of sandy to sandy/loamy ecological landscapes, particularly the Big Arbor Vitae Loamy Hills. Management would incorporate various techniques for promotion and regeneration of red oak. Red oak would be managed at its ecological age range of 60-120 years. Management would always retain older individuals of red oak in any management method used. Management intensity level 3 would typically be used to achieve this objective. Techniques including thinning, prescribed burning, and clearcutting may be employed. Wetlands located in these areas would have no ground disturbance activity.

Primary: Oak, Economic Age

Secondary: Northern Hardwoods, Aspen and White Pine

The primary desired condition in these broad areas is a mixed forest dominated by red oak and other related species, including white pine, aspen, white birch and red maple. This community type is well suited to a variety of sandy to sandy/loamy ecological landscapes. Management would incorporate various techniques for promotion and regeneration of red oak. The main focus would be to shelterwood the pure red oak stands, incorporating 50% tree crown cover removal, active management of the oak regeneration and an overstory removal when regeneration is established. Techniques of mechanical and/or chemical release would favor the red oak regeneration. Planting of oaks would also be considered. Wildlife considerations would retain older individual oaks on all management areas. The age of red oak stands managed this way ranges from 60-120 years. Management intensity level 3 would typically be used to achieve this objective. Techniques for managing secondary species may include thinning, selective harvesting, and clearcutting. Wetlands located in these areas would have no ground disturbance activity.

Primary: Aspen/ Birch, Economic Age

Secondary: Red Oak, and Red, White, and Jack Pine

The primary desired future condition in these broad areas is a forest dominated by aspen and white birch. The forest would include a mix of red oak and red, white, and jack pine. This community type is well suited to a variety of sandy to sandy/loamy ecological landscapes, but is particularly compatible with the Vilas/Oneida Sandy Plains. These areas represent intensive wildlife habitat management areas for game species and renewable forest products. All primary species would be harvested at their economic rotation ages. Secondary, long lived species would be retained in all management areas to promote diversity and structure. Management intensity levels 3 or 4 are appropriate to achieve this objective. Clearcutting would be the primary management technique. Wetlands located in these areas would have no ground disturbance activity.

Primary: Forested Wetlands

Secondary: Mixed Uplands

The primary desired future condition in these broad areas is a mixed site dominated by forest wetland species (black spruce, tamarack, white cedar, etc.). Forested wetlands occur in many ecological landscapes, and are particularly abundant in the Manitowish Peatlands. Forested wetlands can be considered for management on productive sites or to meet native community restoration goals. Management for regenerating black spruce

and tamarack would use accepted forestry techniques including strip cutting and clearcutting. No cedar would be cut. Wetlands that do not produce merchantable trees, are remote and small or are open wetland communities would have no ground disturbance activity. Management intensity levels 1 and 2 are appropriate to achieve this objective, since most forested wetlands would have minimal timber harvest and ground disturbance activity, but regeneration of certain species would require more intensive management. Upland sites within these areas *would be managed* for a variety of objectives including intensity Level 1 and 2 depending on the site and the overall management concept.

Primary: Unforested Wetlands

Secondary: Mixed Uplands

The primary desired future condition in these broad areas is a mixed site dominated by unforested wetlands. Unforested wetlands occur in many ecological landscapes, and are particularly abundant in the Rainbow Wetlands. Management intensity level 0 is appropriate to achieve this objective, since wetlands would have no ground disturbance activity. However, upland sites within these areas *would be managed* for a variety of objectives, including intensity Levels 1 and 2 depending on the site and the overall management concept.

## Historic and Current Management of the NHAL

*In the 19 years since the previous master plan was prepared, the NHAL has been managed to meet the basic goals of this plan but the management has been altered based on new knowledge and policies related to the state forests. The goal of the 1982 plan was “to protect, perpetuate, and manage the natural resources of the property by applying accepted management techniques for the purpose of providing forest products while maximizing the recreational, educational, and cultural benefits for society.” Over this period, management shifted to multiple benefits having a more equal rather than secondary importance. These are listed in Wisconsin Statute 28.04 as “soil protection, public hunting, protection of water quality, production of recurring forest products, outdoor recreation, native biological diversity, aquatic and terrestrial wildlife, and aesthetics.”*

### Historic Condition and Management

- The 1860s upland forest on most of the NHAL was characterized by red and white pine, with a significant secondary component of white birch and aspen, both as mixtures and as patches with a single dominant. This type of forest was the result of the fairly frequent fire caused by lightning and Native Americans. Forest change from severe windstorms, insect or disease are also natural forms of disturbance that sometimes help set the stage for more severe fires. The sandy soils supported vegetation that allowed the fires to burn on the ground and, occasionally, in the forest canopy. There was considerable variation in the particular forest composition.
- Following the cutover in the early part of the 1900s, this private land became public ownership in much of the area that is now the NHAL. This land was then reforested with pine species or developed a second growth forest dominated by early successional species such as aspen and white birch. The forests of aspen and birch were mostly of similar age and reached a harvestable age in the 1970s. Overall, the NHAL's upland forests have been managed since the 1960s to increase the diversity of forest types and ages. At the same time protection of the forest resource and human development from fire prevented the natural disturbance that maintained the historic forest. Current management simulates some aspects of the natural disturbance of fire through timber harvest, planting, soil disturbance, and other methods. [The Current Condition Map](#) shows the current forest composition. The maps are simplified and it is important to remember that within these broad areas there would be a mix of tree species.

### Present Condition and Management

The following section describes the current forest condition and general management objectives and practices that have been used recently on the NHAL. These are general descriptions of the forest communities based on forest reconnaissance data from the NHAL. These descriptions are generalized to provide the reader with information necessary to compare the current condition with the possible alternatives. Additional information on the NHAL's current forest condition can be found in the Shaping the Future source book.

- **Red and White Pine:** Much of the NHAL has dry soils with low to moderate nutrient levels that have good potential to be managed for red and white pine communities. The planting on the NHAL during the early 1900s focused on red pine. Development of red and white pine has been encouraged through forest management practices and there has been a steady increase in these species. Communities dominated by white pine (3.3%) and red pine (7.4%) make up about 11% of the NHAL and these two tree species are found as very common associates throughout the upland forests of the NHAL. For the last 25 years the NHAL has applied Big Tree Silviculture when managing forest stands of these types

(see glossary for definition). As a result of this management mature white and red pines occur throughout the NHAL. Most white and red pines of natural origin are about 80 or 90 years old (some up to 120 years old) and these trees are found as individuals or as small clumps in most aspen, white birch, red oak, and northern hardwood communities.

- **Jack Pine:** Jack pine grows on the driest and poorest soils of the NHAL, making up 3.5% of the property. Many stands of jack pine have had a salvage harvest within the last 10 years because of high mortality from insect infestations. Management has been directed at maintaining this as a component of the forest through planting and actions that increase natural regeneration. The coverage of this type has declined in recent years.
- **Aspen:** Aspen grows across a wide range of soil and ecological conditions, and makes up 33% of the NHAL. Following the cutover in the early part of the century, aspen responded across the forest but created many stands of similar age. Management of aspen since the 1970s has focused on maintaining this type for its wildlife habitat and renewable forest product values while diversifying the ages of the stands. Many of the aspen stands are less than 30 years old. Since 1974, Big Tree Silviculture practices on the forest have resulted in a typical management pattern of harvesting all aspen, white birch and red maple in aspen stands thus reducing competition for red pine, white pine and red oak trees, which are then able to grow faster. This practice has resulted in a steady decline in the aspen cover on the NHAL.
- **White Birch:** This was an important secondary species in the presettlement pine forests and is dependent on regular disturbance to reproduce. It often occurs in association with aspen. It currently occupies about 5% of the NHAL but is quickly declining in extent. In the last 15 years many white birch stands have had a salvage harvest in response to mortality from old age, drought and insect infestations.
- **Red Oak:** This species is considered to have significant wildlife value and is a longer lived tree species. Regeneration of this species requires disturbance and sunlight. It currently covers 7% of the NHAL and most stands are about 90 years old. Management has maintained stable levels throughout the forest.
- **Northern Hardwoods:** This type covers 7% of the NHAL and is represented by a mix of tree species characterized by sugar maple, red maple, yellow birch and basswood. This type grows primarily on the moister, richer soils on the NHAL which are limited in extent across the property. Red maple, however, can grow on a wider range of sites and soil conditions. Management has been directed at maintaining this mix of species on appropriate sites. Many stands are 60-90 years old while some areas are in the old growth stage. This type is slowly increasing across the forest.
- **Hemlock-Hardwoods:** This community type is restricted to small isolated stands where appropriate soil and growing conditions exist. It makes up about 1.5% of the current forest cover. These areas have had very limited harvest with the goal of increasing hemlock. Most are very mature to old growth condition.
- **Forested and Unforested Wetlands:** Forested wetlands support black spruce, northern white cedar, tamarack, mixed swamp conifer or swamp hardwoods. They cover 4% of the forest and are stable in distribution. Non-forested wetlands are open wetlands of muskeg, bog, sedge meadow and poor fen and they cover 13% of the NHAL.
- **Old Growth:** The recovery of an old growth forest in this region following the cutover of the early 1900s is a slow process. The practice of Big Tree Silviculture on the NHAL since 1974 has produced larger trees of some long lived species. While 33% of the stands on the NHAL are 81-120 years old less than 5% of the forest exceeds 100 years in age. In addition, old growth forests include a variety of characteristics in addition to big trees. The oldest forests on the NHAL include various scattered hemlock-hardwood, northern white cedar, and white pine communities.
- **Forest Wildlife Openings:** Some natural openings and additional created openings in the forest are maintained through mowing to provide habitat for some wildlife species.

### **Management Intensity Level**

- The intensity levels are defined on p.15. (See the Current Condition Map for percentages.) The management prescribed for each area is based on the current master plan, site conditions and the ecological management goal for each stand.
- In order to achieve these goals, approximately 1.3% (3,000 ac) of the NHAL experiences a timber harvest annually. Of this 3,000 ac about ½ of this acreage is clearcut and ½ is selective harvest or plantation thinnings each year.
- **Big Tree Silviculture (BTS):** Since 1974 WDNR's State Forests have been mandated to use Big Tree Silviculture. Using this policy, NHAL forestry staff reserved many individual white pine, red pine, sugar maple, eastern hemlock, and red oak trees when conducting clearcut and selective cut timber sales. Because of Big Tree Silviculture the current landscape on the sandy soils of the NHAL is dominated by young aspen forest with a good mixture of 80 to 120-year old white pine, red pine, and red oak.

### **Secondary Results of Public Interest**

The following topics are presented because they have consistently been the areas of highest interest by various stakeholders. Information on these topics will allow most participants to see the range of alternatives related to their specific value on the forest.

- **Aesthetics:** Current aesthetic practices follow the aesthetics handbook guidelines and include aesthetic buffers along roadways and shorelines. Across the forest, most visitors would only occasionally encounter visual impacts of seeing timber harvests and other management actions.
- **Forest Production:** The management of various forest stands for a variety of habitat and ecological goals results in the production of valuable forest products. The annual production of forest products on the NHAL averages over 40,000 cords and 2 million board feet which generates over \$1.5 million. These revenues are used by the state to support forest and recreation management. The current annual allowable cut is about 4,000 ac but only 3,000 ac is normally treated while the other 1,000 ac is field checked for growth and condition.
- **Recreation**
  - ✓ **Trails:** The NHAL manages many designated trails for snowmobiles, hiking, cross country skiing and biking. All forest management activities are reviewed by recreation staff for compatibility with various recreational activities. There are also many logging roads which are used by trail based recreationists but are not designated trails. Performance of regular forest management provides cost effective maintenance of these logging roads used for recreation. When performing forest management actions such as timber harvest, equipment access, or ground disturbance, direct impact to the trails is avoided where possible. When it does not significantly impact the forest management goal, aesthetic management techniques are implemented along recreational trails. Trails may also be rerouted temporarily or permanently to avoid conflict with forest management. Rarely, forest management activities affect the aesthetics of trail based activities and conflict arise. These situations are used as an opportunity for education regarding how forest management is used to guide the forest condition.
  - ✓ **Wildlife/Hunting/Trapping:** Any forest management action, or inaction, will benefit some wildlife species and have negative effects on others. Hunting is the second or third highest recreational activity on the NHAL behind boating/fishing and sometimes camping. Many hunters visit the NHAL each year in pursuit of various game species including white-tailed deer, black bear, ruffed grouse, woodcock, snowshoe hare, red fox, coyote, fisher, bobcat and beaver. An aspen forest is the preferred habitat for these forest game species and has been a management priority for the NHAL. Maintenance of a variety of aspen ages classes across the forest is a game management goal. Current management also supports a variety of habitats which produce game and nongame species such as oak, conifer wetlands, grassy wildlife openings and waterfowl impoundments.

- **Rare Species:** All threatened and endangered species and their habitats are protected within the NHAL and management actions are reviewed by staff from the Endangered Resources program to assure this. More than 75% of the rare species documented on the NHAL are wetland or aquatic species so continued protection of water resources is a priority for management. Current management provides for a variety of listed species from the timber wolf that benefits from young forest that support its prey to osprey and bald eagles that benefit from nest and shoreline protection. Forest birds that favor conifer forests would continue to see improved conditions over time while birds depending on hardwood forests would continue to find limited opportunities for habitat under current management.



## Alternative 1

*Management for a range of natural communities and forest age classes with emphasis on early successional forests dominated by aspen and white birch, and younger forests of red oak, red pine and white pine. Areas with the best capability of producing old growth pine, northern hardwood, and hemlock-hardwood would be managed for an old growth condition.*

Overall, the NHAL's upland forests would be the youngest in this alternative while maintaining a mix of different species. Management would include a wide range of techniques to reach specific goals.

[Alternative 1 Map](#) shows the future desired conditions and management intensities for this alternative. The maps are extremely simplified and it is important to remember that within these broad areas there would be a mix of tree species.

### Future Desired Condition

- **Red and White Pine:** Red and white pine natural communities would be the primary goal on the Trout Lake Drumlins, Vilas Oneida Sandy Hills, Kathana Lake Sandy Plain and part of the Lake Laura Loamy Hills ecological landscapes. Specific areas would be managed to produce red and white pine and one area would be managed as old growth pine. Red and white pine would continue to be components of aspen dominated forests, and depending on ecological site potential, some areas would shift to dominance by red and white pine. In this alternative, pine plantations would become more common.
- **Aspen/ White Birch:** These early successional communities would be the primary goal on the Vilas/Oneida Sandy Plains. Maintenance or small increases in the current levels of aspen (33% of the NHAL) would be the goal. This would reverse a steady decline in aspen that has occurred over the last 50 years. Aspen provides benefits to important wildlife species as well as a renewable source of forest products. White birch requires significant disturbance to be maintained and was the most important secondary species in the historic pine forests. In the last 20 years this species has seen a rapid decline on the forest. This alternative would use clear cuts, scarification or fire to reverse this declining trend.
- **Northern Hardwoods:** The richer soils of areas within the Lake Laura Loamy Hills, Winegar Moraines and the Vilas/Oneida Sandy Hills would be the primary areas managed for this natural community. This alternative would see a reduction in area of northern hardwood management in favor of more red oak and aspen/birch management when compared with Alternatives 2-6. Some areas would be managed for old growth northern hardwoods and would see an increased canopy closure with older trees over present conditions but emphasis would be placed on keeping a diverse mix of species in the northern hardwoods that develop through management to open the canopy. Areas dominated by aspen and other species would likely contain northern hardwoods as secondary species.
- **Hemlock-Hardwoods:** The greatest potential for this community type is on the richer, moister soils found primarily in the Winegar Moraines ecological landscape. The three hemlock-hardwood sites in the Winegar-Moraines are constant throughout Alternatives 1-5. Alternatives 3-6 have more sites in other ecological landscapes than Alternatives 1 and 2. The primary goal would be an old growth forest with increased dominance of hemlock and maintenance of a diversity of hardwoods species. This would be encouraged primarily through selective harvest of hardwoods. Hemlocks would not be harvested. In addition, there are numerous stands of hemlock scattered throughout the forest that are too small to be mapped. These will be monitored to assure a continued presence of hemlock on the landscape.
- **Red Oak:** Alternative 1 has the most area devoted to oak forest management of all the alternatives. Most of this type would be located in the Big Arbor Vitae Loamy Hills ecological landscape. All areas managed for Red Oak would see young oak trees develop and have the necessary disturbance to regenerate this species. Areas dominated by aspen/birch and other species would likely contain red oak as a secondary species.

- **Jack Pine:** This community will be represented primarily in the uplands surrounding the Rainbow Wetlands ecological landscape in Alternatives 1-5. Areas dominated by aspen/birch and other species would likely contain small jack pine stands as a secondary species. Overall, a decrease in jack pine over present conditions would be expected but less than in the other alternatives as jack pine is a disturbance species. Areas suitable only for jack pine would see stands dominated by this species and established with management disturbance (scarification or prescribed fire) and/or planting.
- **Old Growth:** Only the best quality old growth sites that were identified in the CROG and Biotic Inventory on the NHAL would be actively or passively managed for old growth characteristics (CROG “A” and Biotic Inventory “high-high” sites). Those sites with moderate to low potential for developing an old growth forest would have no special management. Select red and white pine forests and hemlock-hardwood forests have the greatest potential to develop old growth while northern hardwood areas would also have some opportunities. The number of specific old growth sites in Alternative 1 is the same as in Alternative 2 but fewer than in Alternatives 3-5.
- **Forested and Unforested Wetlands:** This is a very broad grouping of several natural communities which are located in relatively small areas across most of the forest. Two ecological landscapes, Manitowish Peatland and Rainbow Wetlands, are dominated by various wetland types. Although the maps show changes in the amount of forested and unforested wetlands, their distribution would not actually change between alternatives. Upland sites within the broad forested wetland areas would be managed at a level appropriate to the alternative. Forested wetlands may be managed to maintain the forest type and for forest products in this alternative.
- **Forest wildlife openings:** Under Alternative 1, additional wildlife openings and larger openings would be created. Management would include mowing of created openings as well as relict openings.

### **Management Intensity Level**

- The management intensity level for much of the forest would be Level 4, on a scale of 0 to 4. The intensity levels are defined on p.15. (See Alternative 1 Map for percentages.) The great majority of upland forests on the NHAL would be managed at a tree species’ economic age, which is younger than their biological ages.
- The full range of management techniques would be available over almost all of the upland forest in this alternative. The scale and frequency of management would also be greater than in the other alternatives (ie larger and more frequent aspen clearcuts, more scarification for regeneration of pine and red oak).
- **Big Tree Silviculture (BTS):** BTS has been practiced on the NHAL since 1974 but would not be implemented in this alternative. Therefore, long-lived tree species such as red and white pine and red oak would not be managed for larger diameter sizes.

### **Secondary Results of Public Interest**

The following topics presented because they have consistently been the areas of highest interest by various stakeholders. Information on these topics will allow most participants to see the range of alternatives related to their specific value on the forest.

- **Aesthetics:** Aesthetic practices would follow the aesthetics handbook guidelines and include aesthetic buffers along roadways and shorelines. Across the forest, most visitors would regularly encounter visual impacts of timber harvest and other management.
- **Forest Production:** This alternative emphasizes forest production and game species habitat so aspen/birch is favored over pine species. In the next 20-30 years aspen harvest will be similar to present levels but an increase in harvest of existing large pines and hardwoods will result. Following this, aspen harvest will increase moderately over present levels but at a sustainable level. Oak and pine will also be

managed for regular production of a forest product. The overall area treated annually on the forest will increase moderately from the present 1.3% (3000 ac) but harvests will be larger and more complete than under Alternatives 2-5.

- **Recreation**

- ✓ **Trails:** Trail based recreation experiences minimal impacts from forest management on the NHAL and this would continue under this alternative. All forest management activities are reviewed by recreation staff for compatibility with various recreational activities. Some trail based recreationists use logging roads which are not designated trails. A small increase in the availability of these roads for recreation may be experienced. When performing forest management actions such as timber harvest, equipment access, or ground disturbance, direct impact to the trails is avoided where possible. Rarely, forest management activities may affect the aesthetics of trail based activities.
- ✓ **Wildlife/hunting/trapping:** In Alternative 1, management would focus primarily on aspen/birch but also include red oak. Ages of aspen stands would be regulated so that multiple age classes were always represented on the forest. This alternative would provide optimum habitat for the many species of wildlife that depend on early successional forests. Most game species would prosper under this alternative, and hunting and trapping opportunities would be enhanced.

- **Rare Species:** As in all alternatives threatened and endangered species and their habitats would be protected within the NHAL and management actions would be reviewed by staff from the endangered resources program to assure this. More than 75% of the rare species documented on the NHAL are wetland or aquatic species so continued protection of water resources is a priority for all management alternatives. Several more species would not experience any significant effects across these alternatives. In this alternative, rare species that benefit from aspen forests such as timber wolves would experience an increase in habitat or prey species. A few rare birds of conifer forests such as Connecticut Warblers or Black-backed Woodpecker would experience a decrease in available habitat. Two species of rare birds, Cerulean and Black-throated Blue Warbler, that favor interior hardwood forests would see a gradual decrease in the limited area of closed canopy hardwood forests. The available land suitable to northern hardwood habitat development is limited on the Northern Highland-American Legion.

## Alternative 2

*Management for a range of natural communities and forest age classes with emphasis on a forest dominated by older red and white pine with aspen, white birch and red oak as important secondary species. Areas with the best capability of producing old growth pine, northern hardwood, and hemlock-hardwood would be managed for an old growth condition. A greater emphasis on older northern hardwood forests is proposed as compared to Alternative 1.*

The NHAL's upland forests on sandy soils would be managed similar to present management goals and techniques but with more emphasis on larger harvest areas and younger pine. Overall, the NHAL's upland forests would see a shift to dominance by red and white pine managed with a mix of other species. Because red and white pine are naturally longer-lived than aspen, most of the forest would be older in this alternative than in Alternative 1. Most areas of the forest would be managed toward the same forest types as in Alternative 3 but some areas would have a younger forest or more management tools available. [Alternative 2 Map](#) shows the future desired conditions and management intensities for this alternative. The maps are extremely simplified and it is important to remember that within these broad areas there would be a mix of tree species.

**Future Desired Condition**

- **Red and White Pine:** Red and white pine natural communities would be the primary goal on the Vilas/Oneida Sandy Plains, Trout Lake Drumlins, Vilas Oneida Sandy Hills, Kathlan Lake Sandy Plain and part of the Lake Laura Loamy Hills ecological landscapes. The majority of the NHAL would see a continued slow shift to greater red and white pine component, with aspen-birch and jack pine areas reduced in the long term. While most of the pine forests would be managed for old trees, the specific goal of old growth pine forests would be managed for on fewer areas than found in Alternatives 3- 5. This alternative emphasizes managing the red and white pine for forest products over community restoration but would not involve a large increase in pine plantations. Various natural and artificial regeneration techniques would be used to increase the red/white pine component.
- **Northern Hardwoods:** The slightly richer soils of areas within the Lake Laura Loamy Hills, Winegar Moraines and the Vilas/Oneida Sandy Hills are the primary areas that would be managed for this natural community. This alternative would see more areas of northern hardwood management than in Alternative 1 but less when compared with Alternatives 3-5 in favor of more red oak and red/white pine management. Some areas managed for northern hardwoods would see an increased canopy closure with older trees over present conditions but emphasis would be placed on keeping a diverse mix of species in the northern hardwoods that develop through management to open the canopy. Areas dominated by red and white pine and other species would have less northern hardwoods as secondary species than in Alternative 3-5.
- **Hemlock-Hardwoods:** The greatest potential for this community type is on the richer, moister soils found primarily in the Winegar Moraine ecological landscape. The primary goal would be an old growth forest with increased dominance of hemlock and maintenance of a diversity of hardwoods species. This would be encouraged primarily through selective harvest of hardwoods. Hemlocks would not be harvested. In addition, there are numerous stands of hemlock scattered throughout the forest that are too small to be mapped. These will be monitored to assure a continued presence of hemlock on the landscape.
- **Red Oak:** Alternative 2 has more area devoted to older red oak management than Alternatives 3-5 but none in the old growth class. Most of the this type would be located in the Big Arbor Vitae Loamy Hills ecological landscape. All areas managed for Red Oak would see old oak trees develop and have the necessary disturbance to regenerate this species. Areas managed with disturbance for red and white pine and other species would contain red oak as a secondary species.
- **Jack Pine:** This community will be represented primarily in the uplands surrounding the Rainbow Wetlands ecological landscape. Overall, a decrease in jack pine over present conditions would be expected. Areas suitable only for jack pine would see stands dominated by this species and established with management disturbance (scarification or prescribed fire) and/or planting. Areas dominated by red and white pine and other species would likely contain small jack pine stands as a secondary species in the landscape.
- **Aspen/ White Birch:** Two areas within the Vilas/Oneida Sandy Plains would be specifically managed for an aspen/white birch dominance. These forest types will also be an important secondary species across most ecological landscapes but most prevalent in the Vilas/Oneida Sandy Plains. Current levels of aspen dominated stands (33%) would continue to decrease to about 30% of the forest in the next 50 years and to about 20% in the next 100 years. This alternative would allow the use of techniques such as clearcutting and scarification to maintain a component of white birch. This alternative would halt the recent decline and seek to maintain present levels of white birch stands. Areas actively managed for pine forests would continue to support aspen and birch as secondary species.
- **Old Growth:** Only the best quality old growth sites that were identified in the CROG and Biotic Inventory on the NHAL would be actively or passively managed for old growth characteristics (CROG “A” and Biotic Inventory “high-high” sites). Those sites with very good to moderate potential for developing an old growth forest would be managed, along with the rest of the NHAL, with Big Tree

Silviculture where appropriate. Select red and white pine forests and hemlock-hardwood forests have the greatest potential to develop old growth while northern hardwood and red oak areas would also have some opportunities. Small, scattered old growth patches or individual trees would be managed through Big Tree Silviculture. The number of specific old growth sites in Alternative 2 is the same as in Alternative 1 but fewer than in Alternatives 3-5.

- **Forested and Unforested Wetlands:** Although the maps show changes in the amount of forested and unforested wetlands, their distribution would not actually change between alternatives. Unforested wetlands would have no active management. Two ecological landscapes, Manitowish Peatland and Rainbow Wetlands, are dominated by various wetland types. Upland sites within the broad forested wetland areas would be managed at a level appropriate to the alternative. This would allow a full range of management techniques from passive management to clear cuts. Forested wetlands may be managed to maintain the forest type and for forest products in this alternative.
- **Forest wildlife openings:** Management under Alternative 2 would include mowing existing created openings as well as relict openings.

### **Management Intensity Level**

- The management intensity level for much of the forest would be Level 3, on a scale of 0 to 4. (See the Alternative 2 Map for percentages.) This would allow a full range of management techniques from passive management to clear cuts. The majority of upland forests on the NHAL would be managed at a tree species' biological age, which is older than their economic ages.
- Alternative 2 contains areas that would be managed at all intensity levels. Level 4 forest management is limited to two game management areas where short rotation aspen would be the priority.
- **Big Tree Silviculture (BTS):** BTS is currently practiced on the NHAL and would be implemented in this alternative. Therefore, long-lived tree species including red pine, white pine, hemlock and northern hardwoods and red oak would be managed for larger diameter sizes on high quality sites.

### **Secondary Results of Public Interest**

The following topics presented because they have consistently been the areas of highest interest by various stakeholders. Information on these topics will allow most participants to see the range of alternatives related to their specific value on the forest.

- **Aesthetics:** Aesthetic practices would follow the aesthetics handbook guidelines and include aesthetic buffers along roadways and shorelines. Across the forest, most visitors would occasionally encounter visual impacts of timber harvest and other management.
- **Forest Production:** This alternative emphasizes forest production, but not as much as in Alternative 1. Much of the forest will be managed toward a forest of red and white pine but in the short term, strategies will be used to maximize use of products from aspen stands. In the long term, strategies will focus more on maximizing growth of large pine trees rather than pine forest community structure. The overall area treated annually on the forest will be similar to the present 1.3% (3000 ac) but harvest areas will be larger and product use more complete.
- **Recreation**
  - ✓ **Trails:** Trail based recreation experiences minimal impacts from forest management on the NHAL and this would continue under this alternative. All forest management activities are reviewed by recreation staff for compatibility with various recreational activities. Some trail based recreationists use logging roads which are not designated trails. A small increase in the availability of these roads for recreation may be experienced. When performing forest management actions such as timber

harvest, equipment access, or ground disturbance, direct impact to the trails is avoided where possible. Rarely, forest management activities may affect the aesthetics of trail based activities.

- ✓ **Wildlife/hunting/trapping:** In Alternative 2, aspen would continue as a significant component of the forest but steadily be reduced in favor of red and white pine. Select areas of the forest would be managed specifically for game habitat but most of the forest would not. This alternative would be less beneficial than Alternative 1 to those species that require early successional forests. Populations of some game species would be lower than Alternative 1 and hunting and trapping opportunities would be reduced.
- **Rare Species:** As in all alternatives threatened and endangered species and their habitats would be protected within the NHAL and management actions would be reviewed by staff from the endangered resources program to assure this. More than 75% of the rare species documented on the NHAL are wetland or aquatic species so continued protection of water resources is a priority for all management alternatives. Several more species would not experience any significant effects across these alternatives. In this alternative, rare species that benefit from aspen forests such as timber wolves would experience a slow decrease in habitat or prey species. A few rare birds of conifer forests such as Connecticut Warblers or Black-backed Woodpecker would experience a gradual increase in available habitat. Two species of rare birds, Cerulean and Black-throated Blue Warbler, that favor interior hardwood forests would see little change from the present limited closed canopy hardwood forest opportunities. The available land suitable to northern hardwood habitat development is limited on the Northern Highland-American Legion.

## Alternative 3

*Management for a range of natural communities and forest age classes with emphasis on developing a wide range of natural conditions. The forest would be dominated by older red and white pine with aspen, white birch and red oak as important secondary species. Areas with the best or very good capability of producing old growth pine, northern hardwood, hemlock-hardwood and red oak would be managed for an old growth condition. A greater emphasis on older northern hardwood forests with less aspen, pine and red oak is proposed as compared to Alternatives 1-2.*

The NHAL's upland forests on sandy soils would be managed similar to current management goals and techniques with a continued emphasis on older trees and more specific old growth areas. Most of the forest would see a continuing shift to dominance by red and white pine managed with a mix of other species. The smaller area of the NHAL with slightly richer soils would be managed for older northern hardwood and oak. [Alternative 3 Map](#) shows the future desired condition and management intensity for this alternative. The maps are extremely simplified and it is important to remember that within these broad areas there would be a mix of tree species.

### Future Desired Condition

- **Red and White Pine:** Red and white pine natural communities would be the primary goal on the Vilas/Oneida Sandy Plains, Trout Lake Drumlins, Vilas Oneida Sandy Hills, Kathana Lake Sandy Plain and part of the Lake Laura Loamy Hills ecological landscapes. The majority of the NHAL would see a continued slow shift to a greater red and white pine component, with aspen-birch and jack pine areas

reduced in the long term. While most of the pine forests would be managed for old trees, the specific goal of old growth pine forests would be managed for on fewer areas than found in Alternatives 4 or 5.

- **Northern Hardwoods:** The slightly richer soils of areas within the Lake Laura Loamy Hills, Winegar Moraines and the Big Arbor Vitae Loamy Hills are the primary areas that would be managed for this natural community. This alternative shifts some acreage of oak to northern hardwoods as compared to Alternative 2 and less area of northern hardwood management in favor of more red oak and red/white pine management when compared with Alternatives 4 and 5. Some areas managed for northern hardwoods would see an increased canopy closure with a component of older trees over present conditions but emphasis would be placed on keeping a diverse mix of species in the northern hardwoods that develop through management to open the canopy. Areas dominated by red and white pine and other species would still maintain northern hardwoods as secondary species.
- **Hemlock-Hardwoods:** The greatest potential for this community type is on the richer, moister soils found primarily in the Winegar Moraines ecological landscape. In this alternative, three suitable locations within the Vilas/Oneida Sandy Hills and Vilas/Oneida Sandy Plains are added as hemlock-hardwood sites. The primary goal would be an old growth forest with increased dominance of hemlock and maintenance of a diversity of hardwoods species. This would be encouraged primarily through selective harvest of hardwoods. Hemlocks would not be harvested. In addition, there are numerous stands of hemlock scattered throughout the forest that are too small to be mapped. These will be monitored to assure a continued presence of hemlock on the landscape.
- **Red Oak:** Alternative 3 has less area devoted to red oak management than in Alternative 2 but more than Alternatives 4 and 5. Most of the this type would be located in the Big Arbor Vitae Loamy Hills ecological landscape. All areas managed for red oak would see old oak trees develop and have the necessary disturbance to regenerate this species. However, less area would be devoted to oak old growth than in Alternative 4. Areas managed with disturbance for red and white pine and other species would contain red oak as a secondary species.
- **Jack Pine:** This community will be represented primarily in the uplands surrounding the Rainbow Wetlands ecological landscape. Overall, a decrease in jack pine over present conditions would be expected. Areas suitable only for jack pine would see stands dominated by this species and established with management disturbance (scarification or prescribed fire) and/or planting. Areas dominated by red and white pine and other species would likely contain small jack pine stands as a secondary species in the landscape.
- **Aspen/ White Birch:** Two areas within the Vilas/Oneida Sandy Plains would be specifically managed for an aspen/white birch dominance. These forest types will also be an important secondary species across most ecological landscapes but most prevalent in the Vilas/Oneida Sandy Plains. Current levels of aspen dominated stands (33%) would continue to decrease to about 30% of the forest in the next 50 years and to about 20% in the next 100 years. With the limited disturbance of this alternative, white birch is expected to continue its rapid decline in presence on the forest. This alternative would allow use of techniques such as clearcutting and scarification to maintain a component of white birch. Areas actively managed for pine forests would continue to support some aspen and birch as a secondary species.
- **Old Growth:** The best and very good quality CROG and Biotic Inventory sites (CROG “A” and “AB” and Biotic Inventory “high-high” and “high-medium”) on the NHAL would be actively or passively managed for old growth characteristics. Those identified sites with lower potential for developing an old growth forest would be managed with Big Tree Silviculture where appropriate. Select red and white pine forests and hemlock hardwood forests have the greatest potential to develop old growth while northern hardwood and red oak areas would also have some opportunities. Small, scattered old growth patches or individual trees would be managed through Big Tree Silviculture.

- **Forested and Unforested Wetlands:** Although the maps show changes in the amount of forested and unforested wetlands, their distribution would not actually change between alternatives. Two ecological landscapes, Manitowish Peatland and Rainbow Wetlands, are dominated by various wetland types. Upland sites within the broad forested wetland areas would be managed at a level appropriate to the alternative. Forested wetlands may be managed to maintain the forest type and for forest products in this alternative.
- **Forest wildlife openings:** Management under Alternative 3 would include mowing of existing created openings only.

### **Management Intensity Level**

- The management intensity level for much of the forest would be Level 3, on a scale of 0 to 4. (See Alternative 3 Map for percentages.) This would allow a full range of management techniques from passive management to clear cuts. The majority of upland forests on the NHAL would be managed at a tree species' biological age, which is older than their economic ages.
- Alternative 3 contains areas that would be managed at all intensity levels. Level 4 forest management is limited to 2 game management areas where short rotation aspen would be the priority.
- **Big Tree Silviculture (BTS):** BTS is currently practiced on the NHAL and would be implemented in this alternative. Therefore, long-lived tree species including red pine, white pine, hemlock and northern hardwoods and red oak would be managed for larger diameter sizes on high quality sites.

### **Secondary Results of Public Interest**

The following topics presented because they have consistently been the areas of highest interest by various stakeholders. Information on these topics will allow most participants to see the range of alternatives related to their specific value on the forest.

- **Aesthetics:** Aesthetic practices would follow the aesthetics handbook guidelines and include aesthetic buffers along roadways and shorelines. Across the forest, most visitors would infrequently encounter visual impacts of timber harvest and other management.
- **Forest Production:** Under Alternative 3 levels of forest products generated would be similar to present levels for the next 50 years. Over the next 100 years there may be an increase in oak and pine thinnings and a decrease in aspen clearcuts with the overall area treated on the forest similar to the present 1.3% (3000 ac) treated annually.
- **Recreation**
  - ✓ **Trails:** Trail based recreation experiences minimal impacts from forest management on the NHAL and this would continue under this alternative. All forest management activities are reviewed by recreation staff for compatibility with various recreational activities. Some trail based recreationists use logging roads which are not designated trails. A level of availability for these roads similar to present levels would be expected. When performing forest management actions such as timber harvest, equipment access, or ground disturbance, direct impact to the trails is avoided where possible. Rarely, forest management activities may affect the aesthetics of trail based activities.
  - ✓ **Wildlife/hunting/trapping:** In Alternative 3, select areas of the forest would be managed specifically for game habitat but most of the forest would not. Aspen would continue as a significant component of the forest but steadily be reduced in favor of red/white pine. This alternative would be less beneficial than Alternative 1 but similar to alternative 2 to those species that require early successional forests. Populations of some game species may be lower than Alternative 1.



- Rare Species:** As in all alternatives threatened and endangered species and their habitats would be protected within the NHAL and management actions would be reviewed by staff from the endangered resources program to assure this. More than 75% of the rare species documented on the NHAL are wetland or aquatic species so continued protection of water resources is a priority for all management alternatives. Several more species would not experience any significant effects across these alternatives. In this alternative, rare species that benefit from aspen forests such as timber wolves would experience a slow decrease in habitat or prey species. A few rare birds of conifer forests such as Connecticut Warblers or Black-backed Woodpecker would experience a gradual increase in available habitat. Two species of rare birds, Cerulean and Black-throated Blue Warbler, that favor interior hardwood forests would see a small increase in habitat from the present limited closed canopy hardwood forest opportunities. The available land suitable to northern hardwood habitat development is limited on the Northern Highland-American Legion.

## Alternative 4

*Management for a range of natural communities with emphasis on a forest dominated by older red and white pine, with older white birch, aspen and red oak as secondary species of declining importance. The percent of young forest age classes would be reduced from Alternatives 1-3 with older ages emphasized across most forest types. Areas with good, very good and best capability of producing old growth pine, northern hardwood, hemlock-hardwood and red oak would be managed for an old growth condition. A greater emphasis on older northern hardwood forests with less aspen, pine and red oak is proposed as compared to Alternatives 1-3.*

Overall, the NHAL's upland forests would see a continuing shift to dominance by older red and white pine while acreage of aspen would slowly decrease over present conditions. This alternative presents more old growth areas than under present management but does not include the lowest quality identified CROG and Biotic Inventory sites included in Alternative 5. More techniques to manage for old growth forest would be available. The percent of young forest age classes would be reduced from Alternatives 1-3 with older ages emphasized across most forest types. Specific areas managed for early successional forest game habitat are provided. Overall management intensity increases from Alternative 5. [Alternative 4 Map](#) shows the future desired condition and management intensity for this alternative. The maps are extremely simplified and it is important to remember that within these broad areas there would be a mix of tree species.

### Future Desired Condition

- Red and White Pine:** Red and white pine natural communities would be the primary goal on the Vilas/Oneida Sandy Plains, Trout Lake Drumlins, Vilas Oneida Sandy Hills, Kathana Lake Sandy Plain and part of the Lake Laura Loamy Hills ecological landscapes. The majority of the NHAL would see a slow shift to greater red and white pine dominance, with aspen-birch, red oak and jack pine areas reduced in the long term. Alternative 4 would have fewer management tools to increase pine forest development than in Alternatives 2-3 which will slow the conversion of aspen to pine forests.
- Northern Hardwoods:** The slightly richer soils of areas within the Lake Laura Loamy Hills, Winegar Moraines and the Big Arbor Vitae Loamy Hills are the primary areas that would be managed for this natural community. Areas dominated by northern hardwoods would see increased canopy closure and a greater component of older trees. Alternative 4 offers management opportunities that were not available in Alternative 5. Selective harvest would be used to maintain greater tree species diversity in the northern hardwood group than would result from Alternative 5. Over time the area of more shade tolerant species such as red maple, sugar maple and basswood would increase while the percentage of

red oak , white birch and aspen would decrease. Some areas dominated by red and white pine and other species would likely see an increase in northern hardwoods as secondary species.

- **Hemlock-Hardwoods:** The greatest potential for this community type is on the richer, moister soils found primarily in the Winegar Moraines ecological landscape. In Alternatives 3 and 4, 3 suitable locations within the Vilas/Oneida Sandy Hills and Vilas/Oneida Sandy Plains are included as hemlock-hardwood sites that are not found in Alternatives 1 and 2. The primary goal would be an old growth forest with increased dominance of hemlock and maintenance of a diversity of hardwoods species. This would be encouraged primarily through selective harvest of hardwoods. Hemlocks would not be harvested. In addition, there are numerous stands of hemlock scattered throughout the forest that are too small to be mapped. These will be monitored to assure a continued presence of hemlock on the landscape.
- **Red Oak:** Alternative 4 would result in a significant decline in acreage managed for red oak as compared with Alternatives 1-3. Several small areas will be managed for old growth red oak with one area managed for younger age oaks. These small areas are all located within the Vilas/Oneida Sandy Plains. All areas managed for Red Oak would see older larger oak trees develop and have the necessary disturbance to regenerate this species. Areas managed with disturbance for red and white pine and other species would contain red oak as a secondary species.
- **Jack Pine:** This community will be represented primarily in the uplands surrounding the Rainbow Wetlands ecological landscape. Overall, a decrease in jack pine over present conditions would be expected. Areas suitable only for jack pine would see stands dominated by this species and established with management disturbance (scarification or prescribed fire) and/or planting. Areas dominated by red and white pine and other species would likely contain small jack pine stands as a secondary species in the landscape.
- **Aspen/ White Birch:** Two areas within the Vilas/Oneida Sandy Plains would be specifically managed for an aspen/white birch dominance. These forest types will also be a secondary species across most ecological landscapes but most prevalent in the Vilas/Oneida Sandy Plains. Current levels of aspen dominated stands (33%) would continue to decrease to about 28% of the forest in the next 50 years and to about 18% in the next 100 years. With the limited disturbance of this alternative white birch is expected to continue its rapid decline in presence on the forest. Areas actively managed for pine forests would continue to support some aspen and birch as a secondary species.
- **Old Growth:** Most old growth sites that were identified in the CROG and Biotic Inventory on the NHAL would be actively or passively managed for old growth characteristics. Those sites with the lowest potential for developing an old growth forest would be managed with Big Tree Silviculture where appropriate. Select red and white pine forests and hemlock hardwood forests have the greatest potential to develop old growth while northern hardwood and red oak areas would also have some opportunities. Small, scattered old growth patches or individual trees would be managed to enhance their old growth characteristics.
- **Forested and Unforested Wetlands:** Although the maps show changes in the amount of forested and unforested wetlands, their distribution would not actually change between alternatives. Two ecological landscapes, Manitowish Peatland and Rainbow Wetlands, are dominated by various wetland types. Upland sites within the broad forested wetland areas would be managed at a level appropriate to the alternative. Forested wetlands may be managed to maintain the forest type and for forest products in this alternative.
- **Forest wildlife openings:** Management under Alternative 4 would include mowing of existing created openings only.

### **Management Intensity Level**

- The management intensity level for much of the forest would be Level 2, on a scale of 0 to 4. Other upland forests would be managed at levels 3 and 1. (See the Alternative 4 Map for percentages.) The majority of upland forests on the NHAL would be managed at a tree species' biological age, which is older than their economic ages. Some old growth areas would be managed at a lower intensity level than in Alternatives 1-3.
- The full range of management techniques would be available over much of the upland forest in this alternative, although many areas would be at intensity level 1, which does not allow for clearcutting, scarification or ground disturbance to facilitate pine or oak regeneration. There is a small increase in the acreage under intensity level 3 as compared to Alternative 5 thus allowing more management options to achieve the prescribed goals. The scale and frequency of management would be more limited than in Alternatives 1-3.
- **Big Tree Silviculture (BTS):** BTS is currently practiced on the NHAL and would be implemented in this alternative. Therefore, long-lived tree species including red pine, white pine, hemlock and northern hardwoods and red oak would be managed for larger diameter sizes on high quality sites.

### **Secondary Results of Public Interest**

The following topics presented because they have consistently been the areas of highest interest by various stakeholders. Information on these topics will allow most participants to see the range of alternatives related to their specific value on the forest.

- **Aesthetics:** Aesthetic practices would follow the aesthetics handbook guidelines and include aesthetic buffers along roadways and shorelines. Across the forest, most visitors would only rarely encounter visual impacts of timber harvest and other management.
- **Forest Production:** Under this alternative there may be slight increase in area treated on the forest from the 1.3% (3000 ac) currently treated annually. However, most of this area would experience thinnings and small group harvest. Some areas would use clear cuts as a management tool to maintain pine or early successional forest. There would be a slight decrease in pulp products and reduced generation of saw timber over present conditions. Because of smaller size and reduced volume per sale the revenue generated from timber sales may decrease.
- **Recreation**
  - ✓ **Trails:** Trail based recreation experiences minimal impacts from forest management on the NHAL and this would continue under this alternative. All forest management activities are reviewed by recreation staff for compatibility with various recreational activities. Some trail based recreationists use logging roads which are not designated trails. A level of availability for these roads similar to present levels would be expected. When performing forest management actions such as timber harvest, equipment access, or ground disturbance, direct impact to the trails is avoided where possible. Rarely, forest management activities may affect the aesthetics of trail based activities.
  - ✓ **Wildlife/hunting/trapping:** Alternative 4 would create fewer age classes of early successional forests. As in alternatives 2 and 3, select areas of the forest would be managed specifically for game habitat but most of the forest would not. This alternative would be even less beneficial to most of the game species. Under this alternative the diversity of habitat conditions is reduced and would accommodate fewer varieties of forest wildlife.
- **Rare Species:** As in all alternatives threatened and endangered species and their habitats would be protected within the NHAL and management actions would be reviewed by staff from the endangered resources program to assure this. More than 75% of the rare species documented on the NHAL are wetland or aquatic species so continued protection of water resources is a priority for all management alternatives. Several more species would not experience any significant effects across these alternatives.

In this alternative, rare species that benefit from aspen forests such as timber wolves would experience a slow decrease in habitat or prey species. A few rare birds of conifer forests such as Connecticut Warblers or Black-backed Woodpecker would experience a gradual increase in available habitat. Two species of rare birds, Cerulean and Black-throated Blue Warbler, that favor interior hardwood forests would see an increase in habitat from the present limited closed canopy hardwood forest opportunities. The available land suitable to northern hardwood habitat development is limited on the Northern Highland-American Legion.

## Alternative 5

*Management for a range of natural communities with emphasis on a forest dominated by older red and white pine, with older white birch, aspen and red oak as secondary species of declining importance. The percent of young forest age classes would be reduced from Alternatives 1-4 with older ages emphasized across most forest types. All areas with moderate to best capability of producing old growth pine, northern hardwood, hemlock-hardwood and red oak would be managed for an old growth condition. Most northern hardwood and hemlock hardwood sites would be passively managed for an old growth condition. No areas would have management specifically for aspen/birch.*

Overall, the NHAL's upland forests would see a continuing shift to dominance by older red and white pine managed with a mix of other species on most of the forest. Later successional forest would increase while acreage of aspen would slowly decrease. This alternative provides for old growth management on all sites identified in the Community Restoration and Old Growth (CROG) assessment and all upland Biotic Inventory sites. [Alternative 5 Map](#) shows the future desired condition and management intensity for this alternative. The maps are extremely simplified and it is important to remember that within these broad areas there would be a mix of tree species.

### Future Desired Condition

- **Red and White Pine:** Red and white pine natural communities would be the primary goal on the Vilas/Oneida Sandy Plains, Trout Lake Drumlins, Vilas Oneida Sandy Hills, and Kathana Lake Sandy Plain ecological landscapes. The majority of the NHAL would see a slow shift to greater red and white pine dominance, with aspen-birch, red oak and jack pine areas reduced in the long term. Alternative 5 would have fewer management tools to increase pine forest development than in Alternatives 2-4 which will slow the conversion of aspen to pine forests.
- **Northern Hardwoods:** The slightly richer soils of areas within the Lake Laura Loamy Hills, Winegar Moraines and the Big Arbor Vitae Loamy Hills are the primary areas that would be managed for this natural community. Areas dominated by northern hardwoods would see increased canopy closure and a greater component of older trees. Most areas of northern hardwood would not be actively managed to maintain species diversity within stands. Over time the area of more shade tolerant species such as red maple, sugar maple and basswood would increase while the percentage of red oak, white birch and aspen would decrease. Areas dominated by red and white pine and other species would likely see an increase in northern hardwoods as secondary species.
- **Hemlock-Hardwoods:** The greatest potential for this community type is on the richer, moister soils found primarily in the Winegar Moraines ecological landscape. In this alternative, one more suitable location is added for a total of four sites within the Vilas/Oneida Sandy Hills and Vilas/Oneida Sandy Plains to be managed for hemlock-hardwood sites. The primary goal would be an old growth forest with

hemlock and hardwood species. In this alternative there would be no active management within these stands so a passively managed forest of old trees is favored over a forest actively managed to encourage dominance of hemlock. In addition, there are numerous stands of hemlock scattered throughout the forest that are too small to be mapped. These will be monitored to assure a continued presence of hemlock on the landscape.

- **Red Oak:** Alternative 5 represents a significant decline in acreage managed for red oak as compared with Alternatives 1-3. It adds two new old growth sites to the several small areas managed for old growth red oak presented in Alternative 4. These small areas are all located within the Vilas/Oneida Sandy Plains. Areas managed for Red Oak with a Level 1 intensity would see older larger oak trees develop with necessary disturbance to regenerate this species. Areas managed with disturbance for red and white pine and other species would likely contain red oak as a secondary species.
- **Jack Pine:** This community will be represented primarily in the uplands surrounding the Rainbow Wetlands ecological landscape. Overall, a decrease in jack pine over present conditions would be expected. Areas suitable only for jack pine would see stands dominated by this species and established with management disturbance (scarification or prescribed fire) and/or planting. Areas dominated by red and white pine and other species would likely contain small jack pine stands as a secondary species in the landscape.
- **Aspen/ White Birch:** No areas specifically managed for an aspen/white birch dominance are presented in Alternative 5. These forest types will also be a secondary species across most ecological landscapes but most prevalent in the Vilas/Oneida Sandy Plains. Current levels of aspen dominated stands (33%) would continue to decrease to about 25% of the forest in the next 50 years and to about 15% in the next 100 years. With the limited disturbance of this alternative white birch is expected to continue its rapid decline in presence on the forest. Areas actively managed for pine forests would continue to support some aspen and birch as a secondary species.
- **Old Growth:** All old growth sites that were identified in the CROG and Biotic Inventory on the NHAL would be actively or passively managed for old growth characteristics. Select red and white pine forests and hemlock hardwood forests have the greatest potential to develop old growth while northern hardwood and red oak areas would also have some opportunities. Small, scattered old growth patches or individual trees would be managed to enhance their old growth characteristics.
- **Forested and Unforested Wetlands:** Although the maps show changes in the amount of forested and unforested wetlands, their distribution would not actually change between alternatives. Upland sites within the broad forested wetland areas would be managed at a level appropriate to the alternative. Unlike the other alternatives, forested wetlands would not be managed to maintain the forest type or for forest products in this alternative. Significant increases in dead and downed swamp conifers would be expected in the next 50 years.
- **Forest wildlife openings:** Some existing wildlife openings would be eliminated under this alternative. The remaining openings would be maintained by mowing.

### Management Intensity Level

- This alternative presents the lowest management intensity of the ecologically based alternatives but not as low as Alternative 6, which emphasizes aesthetic goals. The management intensity level for much of the forest would be Level 2, on a scale of 0 to 4. Other upland forests would be managed at levels 3, 1, and 0. (See Alternative 5 Map for percentages.) The majority of upland forests on the NHAL would be managed at tree species' biological age, which is older than their economic ages. This alternative provides for some Northern Hardwood Old Growth sites to be passively managed (Level 0).
- A range of management techniques would be available over much of the upland forest in this alternative, although many areas would be at intensity level 1, which does not allow for scarification or ground

disturbance to facilitate pine or oak regeneration. The scale and frequency of management would be more limited than in Alternatives 1-4.

- **Big Tree Silviculture (BTS):** BTS is currently practiced on the NHAL and would be implemented in this alternative. Therefore, long-lived tree species including red pine, white pine, hemlock and northern hardwoods and red oak would be managed for larger diameter sizes on high quality sites.

### Secondary Results of Public Interest

The following topics presented because they have consistently been the areas of highest interest by various stakeholders. Information on these topics will allow most participants to see the range of alternatives related to their specific value on the forest.

- **Aesthetics:** Aesthetic practices would follow the aesthetics handbook guidelines and include aesthetic buffers along roadways and shorelines. Across the forest, most visitors would only rarely encounter visual impacts of timber harvest and other management.
- **Forest Production:** Under this alternative there may be a slight increase in area treated on the forest from the 1.3% (3000 ac) currently treated annually. However, most of this area would experience thinnings and small group harvest and only limited clear cuts would occur. There would be a small decrease in pulp products and reduced generation of saw timber. Because of smaller size and reduced volume per sale the revenue generated from timber sales may decrease.
- **Recreation**
  - ✓ **Trails:** Trail based recreation experiences minimal impacts from forest management on the NHAL and this would continue under this alternative. All forest management activities are reviewed by recreation staff for compatibility with various recreational activities. Some trail based recreationists use logging roads which are not designated trails. A level of availability for these roads similar to present levels would be expected. When performing forest management actions such as timber harvest, equipment access, or ground disturbance, direct impact to the trails is avoided where possible. Rarely, forest management activities may affect the aesthetics of trail based activities.
  - ✓ **Wildlife/hunting/trapping:** In Alternative 5 no areas of the forest would be managed specifically for game habitat as is outlined in Alternatives 1-4. Under Alternative 5 an even greater decline in early successional forests would occur and populations of those species that require young forests would decline. As many of the commonly sought game species fall into this category, hunters and trappers would have fewer opportunities than in Alternatives 1-4. Under this alternative the diversity of habitat conditions is reduced even more and would accommodate fewer varieties of forest wildlife.
- **Rare Species:** As in all alternatives threatened and endangered species and their habitats would be protected within the NHAL and management actions would be reviewed by staff from the endangered resources program to assure this. More than 75% of the rare species documented on the NHAL are wetland or aquatic species so continued protection of water resources is a priority for all management alternatives. Several more species would not experience any significant effects across these alternatives. In this alternative, rare species that benefit from aspen forests such as timber wolves would experience a slow decrease in habitat or prey species. A few rare birds of conifer forests such as Connecticut Warblers or Black-backed Woodpecker would experience a gradual increase in available habitat. Two species of rare birds, Cerulean and Black-throated Blue Warbler, that favor interior hardwood forests would see an increase in habitat from the present limited closed canopy hardwood forest opportunities. The available land suitable to northern hardwood habitat development is limited on the Northern Highland-American Legion.

## Alternative 6

*Approximately 36% of the forest will have no active management with the primary goal being a landscape where there is little evidence of human impact as opposed to managing for a specific natural community. On the remainder of the property the management will be as described in Alternative 5. The percent of young forest age classes would be reduced from Alternatives 1-5 with older ages emphasized across most forest types.*

**NOTE:** This management alternative is designed to represent a resource management scenario which would be compatible with the maximum Wild Resources designation outlined in Wild Resources Areas Alternative V. This relationship does not necessarily imply the restrictions on recreation that are part of a wild resources designation, although reduced road access is likely. These are intentionally presented separately to allow public input on a variety of options.

Within the Wild Resources Areas, the present forest cover would be allowed to grow old, die and succeed naturally to a shade tolerant forest type. Natural disturbances such as wind may occur to set back succession and provide regeneration of aspen/birch and some pines. Other natural disturbances such as insect infestations and wild fire may be allowed to impact Wild Resources Areas as long as these events do not threaten adjacent lands. If such a natural disturbance within a Wild Resources Area may threaten adjacent lands it would not be allowed to proceed naturally. Wild Resources Areas would make up 80,354 acres, or 36% of the state-owned land on the NHAL.

Habitat management and restoration would only be conducted outside of Wild Resources Areas and other special designation areas. In order to meet the aesthetic and wilderness experience goals, the Wild Resources Areas would not be managed for a specific natural community. The scientifically generated natural community goals and practices presented in Alternatives 1-5 will not be used within the Wild Resources Areas. In the actively managed areas outside the Wild Resources Areas, the forest will experience a continuing shift to dominance by older red and white pine managed with a mix of other species. Later successional forest attributes would increase slowly over the next 50-100 years after Wild Resources Areas and low intensity management levels are incorporated. Aspen acreage would slowly decrease. [Alternative 6 Map](#) shows the Wild Resources Area distribution and future desired condition and management intensity for this alternative. The maps are extremely simplified and it is important to remember that within these broad areas there would be a mix of tree species.

### Future Desired Condition

- **Red and White Pine:** The majority of the NHAL would see a slow shift to greater red and white pine dominance, with aspen-birch, red oak and jack pine areas reduced in the long term. Alternative 6 would see less management of pine stands as Wild Resources Areas are designated. Wild Resources Area stands will see no management while pine stands outside Wild Resources Areas will see management levels as in Alternative 5. In existing red and white pine stands over time, shade tolerant (white pine or hardwoods) understory trees would become established and shade intolerant red pine would slowly decrease. Because many stands were established after fires or were planted after harvesting, Wild Resources Areas will see a long-term (100-200 year) trend to sandy soil shade tolerant hardwoods, such as red maple.

- **Northern Hardwoods:** Areas dominated by northern hardwoods would see conditions similar to Alternative 5. All Wild Resources Areas would have no management and slow stand age progression to older stand characteristics than the present. Shade tolerant tree species would, over time represent more of the stand secondary species. Wild Resources Areas dominated by red and white pine, aspen, white birch, and red oak would likely overtime see an increase in sugar maple, red maple, basswood and yellow birch as secondary tree species.
- **Hemlock-Hardwoods:** The greatest potential for this community type is on the richer, moister soils found primarily in the Winegar Moraines ecological landscape. In this alternative, one more suitable location is added for a total of four sites within the Vilas/Oneida Sandy Hills and Vilas/Oneida Sandy Plains to be managed for hemlock-hardwood sites. The primary goal would be an old growth forest with hemlock and hardwood species. In this alternative there would be no active management within these stands so a passively managed forest of old trees is favored over a forest actively managed to encourage dominance of hemlock. In addition, there are numerous stands of hemlock scattered throughout the forest that are too small to be mapped. These will be monitored to assure a continued presence of hemlock on the landscape.
- **Red Oak:** Areas managed for red oak with a Level 1 intensity would see older larger oak trees develop with necessary management disturbance to regenerate this species. Areas of red oak with no active management in Wild Resources Areas would see slow development of older red oak and a slow shift to shade tolerant species such as red maple, sugar maple and white pine. Areas managed with disturbance for red and white pine and other species would likely contain red oak as a secondary species. Red oak regeneration requires light on the forest floor and a seed source nearby. In the long run (50-100 years), Red oak mortality would give way to understory sugar maple, red maple and white pine. Red oak establishment in Wild Resources Areas would be limited to natural disturbances such as wind throw.
- **Jack Pine:** Areas managed primarily for Jack Pine would see older stands dominated by this species and established with management disturbance or planting. Areas dominated by red and white pine and other species would likely contain small jack pine stands as a secondary species in the landscape. Wild Resources Areas, having no active management, would see jack pine stands progress to dying stands and slowly mortality would eliminate the species. On these sandy, nutrient poor sites the next generation would probably consist of a mixture of scrub oak, cherry, red maple, balsam fir and some scattered pines.
- **Aspen/ White Birch:** Including both Wild Resources and actively managed areas, current levels of aspen dominated stands (33%) would continue to decrease to about 23% of the forest in the next 50 years and to about 10% in the next 100 years. With the limited disturbance of this alternative white birch is expected to continue its rapid decline in presence on the forest. Areas actively managed for pine forests would continue to support some aspen and birch as a secondary species. Wild Resources Areas would experience a decline in aspen and white birch as stands reach biological age and deteriorate from disease. The future condition would include shade tolerant tree species like white pine, cherry and red maple establishing on dry, sandy sites. Aspen and white birch would remain as a minor component of these future stands. Where young age stands presently exist aspen/white birch would remain through their life spans (70-80 years).
- **Old Growth:** All old growth sites, from high to low potential, that were identified in the CROG and Biotic Inventory on the NHAL would be actively or passively managed for old growth characteristics, as in Alternative 5. However, in the Wild Resources Areas no active management would be provided to direct the tree species that develop in these old growth areas or to speed the process of growing larger trees. Select red and white pine forests and hemlock hardwood forests have the greatest potential to develop old growth while northern hardwood and red oak areas would also have some opportunities. Small, scattered old growth patches or individual trees outside Wild Resources Areas would be managed to enhance their old growth characteristics. The slow progression to old growth characteristics would take another 100-200 years for long-lived species. Stands of short-lived species would decline and be



slowly replaced by some combination of shade tolerant species and some pioneer species (50-100 years).

- **Forested and Unforested Wetlands:** Although the maps show changes in the amount of forested and unforested wetlands, their distribution would not actually change between alternatives. Upland sites within the broad-forested wetland areas would be managed at a level appropriate to the alternative. Forested wetlands would not be managed to maintain the forest type or for forest products in this alternative. Significant increases in dead and downed swamp conifers would be expected in the next 50 years. Upland sites within this habitat type and in a Wild Resources Areas would reach biological age over time and progress through mortality to naturally regenerate as more shade tolerant species. The soil type and available seed source of the forested stand will determine what will develop. A slow natural process will favor shade tolerant trees and a catastrophic disturbance will favor pioneer species to regenerate.
- **Forest wildlife openings:** All created wildlife openings would be eliminated under this alternative. Natural bracken grasslands would be maintained if not in a Wild Resources Area.
- **Wild Resources:** This alternative proposes to maximize the Wild Resources Area experience with large areas where some natural processes predominate and evidence of human cultural impact is low. No disturbance, maintenance, planting or stand changes will be provided. Natural processes over time would be the factor that sees succession proceed or sets it back. The natural forest types of this region are disturbance driven and require large and small disturbance to provide necessary changes. Wind events and possibly insect and disease outbreaks can provide this disturbance in Wild Resources Areas. Insect and disease outbreaks as well as wild fires may be allowed to proceed naturally unless they pose a threat to resources outside the Wild Resources Area boundary. For a discussion of compatibility, see the compatibility matrix on page 97.

### **Management Intensity Level**

- This alternative presents the lowest management intensity levels of any of the alternatives. The management intensity level for much of the forest would be Level 2, on a scale of 0 to 4. Other upland forests would be managed at levels 3, 1, and 0. (See Map 6 for percentages.) The majority of upland forests on the NHAL would be managed at tree species' biological age, which is older than their economic ages. This alternative has the maximum areas in passive management (Level 0).
- A range of management techniques would be available over some of the upland forest in this alternative, although many areas would be at intensity level 1, which does not allow for clear cutting, scarification or ground disturbance to facilitate pine or oak regeneration. The scale and frequency of management would be more limited than in Alternatives 1-5.
- **Big Tree Silviculture (BTS):** BTS is currently practiced on the NHAL and would be implemented in this alternative outside of the Wild Resources Areas. Therefore, long-lived tree species including red pine, white pine, hemlock and northern hardwoods and red oak would be managed for larger diameter sizes on appropriate sites. Wild Resources Areas will see all trees growing to old age and mortality on all sites, barring any natural disturbance.

### **Secondary Results of Public Interest**

- **Aesthetics:** The Wild Resources Areas within this alternative are driven by the aesthetic request of some citizens to have large areas without management disturbance. Aesthetic practices in the managed would follow the aesthetics handbook guidelines and include aesthetic buffers along roadways and shorelines. Across the forest, most visitors would only rarely encounter visual impacts of timber harvest and other management. Wild Resources Areas have little to no vehicle access, trails, bikes, and horses, and no snowmobiles or timber harvest.

- **Forest Production:** Under this alternative there would be less area treated on the forest from the 1.3% (3000 ac) currently treated annually. However, most of this area, excluding Wild Resources Areas would experience thinnings and small group harvest and only limited clear cuts would occur. There would be a decrease in pulp products and reduced harvest of saw timber products. Because of smaller size and reduced volume per sale the revenue generated from timber sales may decrease. This alternative presents the smallest amount of timber harvesting. Wild Resources Areas would remove 80,354 acres, or 36 % of the forest, from any form of active management.
- **Recreation**
  - ✓ **Trails:** Some trail based recreationists use logging roads which are not designated trails. There would be a significant reduction in the availability of these roads on 36% of the forest as they would be closed to vehicles and not maintained in Wild Resources Areas as part of Alternative 6. Trail based recreation experiences minimal negative impacts from forest management on the NHAL and this would continue under this alternative. All forest management activities are reviewed by recreation staff for compatibility with various recreational activities. When performing forest management actions such as timber harvest, equipment access, or ground disturbance, direct impact to the trails is avoided where possible. Rarely, forest management activities may affect the aesthetics of trail based activities.
  - ✓ **Wildlife/hunting/trapping:** In Alternative 6 no areas of the forest would be managed specifically for game habitat as is outlined in Alternatives 1-4. Under Alternative 6 the greatest decline in early successional forests would occur and populations of those species that require young forests would decline. As many of the commonly sought game species fall into this category, hunters and trappers would have fewer opportunities than in Alternatives 1-5. Under this alternative the diversity of habitat conditions is reduced even more and would accommodate fewer varieties of forest wildlife. In addition, the Wild Resources Areas would have restrictions on vehicle access which would reduce accessibility of forest roads for hunting.
- **Rare Species:** As in all alternatives threatened and endangered species and their habitats would be protected within the NHAL and management actions would be reviewed by staff from the Endangered Resources program to assure this. More than 75% of the rare species documented on the NHAL are wetland or aquatic species so continued protection of water resources is a priority for all management alternatives. Several more species would not experience any significant effects across these alternatives. In this alternative, rare species that benefit from aspen forests such as timber wolves would experience a slow decrease in habitat for prey species. A few rare birds of conifer forests such as Connecticut Warblers or Black-backed Woodpecker would experience a gradual increase in available habitat. However, the increase in conifer habitat reduced or slower in the Wild Resources Areas because there would be no specific management to produce this habitat. Two species of rare birds, Cerulean and Black-throated Blue Warbler, that favor interior hardwood forests would see an increase in habitat from the present limited closed canopy hardwood forest opportunities. However, the available land suitable to northern hardwood habitat development is limited on the NHAL.